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Protein Kinase C and Calcium/Calmodulin-dependent Protein Kinase II signaling on hippocampal neurogenesis in Wistar rat after Docosahexanoic acid (DHA) supplementation

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Abstract

Neurogenesis plays an important role in learning, memory and neural plasticity. Docosahexanoic acid (DHA) influences neurogenesis. However the mechanism of DHA in neurogenesis is still unclear. In this study, the effect of DHA on Protein kinase C (PKC) and Calcium/Calmodulin-dependent Protein Kinase II (CaMKII) signaling in the adult hippocampus was investigated. An experimental study was performed on Rattus norvegicus Wistar strain aged 4 weeks given DHA supplementation for 1 month, which were divided into 3 groups; DHA in water, DHA in milk and aquadest in control groups. Each group consisted of 10 rats. We evaluated kinase signaling pathway enzyme by ELISA; progenitor cell expression and neurogenic mature cells by immunohistochemistry tests. Mean concentration of PKC was lower on DHA in water (67±37 ng/g), milk (51±17ng/g) than control groups (154±98ng/g). Mean concentration of CaMKII was lower on DHA in water (4±2ng/g), milk (4±1ng/g) than control groups(8±2ng/g). The expression of β-III Tubulin, Nestin, NeuN, GFAP and GalC was significantly higher in DHA groups than control (p. 0.000). Path analysis significantly showed linkage of CaMKII to Nestin(r. -0.587;p. 0.024). These results show that DHA supplementation influences neurogenesis predominantly by the direct signal pathway of CaMKII.

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